may be provided with a bias magnetic field-applying film of a hard magnetic film or an antiferromagnetic film, which is to apply a bias magnetic field to the free layer . In this case, it is desirable that the bias magnetic field is applied in the direction nearly perpendicular to the magnetization direction of the pinned magnetic layer 2. In Fig. 32, 9 is a substrate.

Of the layers constituting the spin valve film 8 noted above, the MR-improving layer 4 is the characteristic part of the invention. The MR-improving layer 4 in Fig. 32 is of a laminate film comprising a first metal film 4a and a second metal film 4b. The metal films 4a and 4b function as underlayers for the spin valve film 8, and these may contain at least one element selected from Cu, Au, Ag, Pt, Rh, Ru, Al, Ti, Zr, Hf, Pd and Ir.

Of those plural metal films, the essential element constituting the first metal film 4a that is adjacent to the first magnetic layer (free layer) 1 does not form solid solution with the essential element constituting the free layer 1. Preferably, the same shall apply also to the second metal film 4b. Specifically, it is desirable that the essential element constituting the second metal film 4b does not form solid solution with the essential element constituting the free layer 1. In particular, the essential elements each constituting those first and second metal films 4a and 4b may not form solid

solution with each other. It is further desirable that the first metal film 4a to be adjacent to the free layer 1 is of a metal having a short electron wavelength, while the second metal film 4b adjacent to the first metal film 4a is of a metal having a longer electron wavelength (than that of the metal constituting the first metal film 1a).

The definition "not forming solid solution" as referred to herein is explained. For two different elements A and B, the condition in which one element A does not form solid solution with another element B (for the terminology "not forming solid solution") is meant to indicate the following condition: In a binary phase diagram (for example, see Binary Alloy Phase Diagram, 2nd edition, ASM International, 1990, etc.), when the amount by at.% of B capable of dissolving in a matrix of A to form solid solution at low temperatures around room temperature or so, and the amount by at.% of A capable of dissolving in a matrix B to form solid solution at such low temperatures are both at most 10 %, the combination of those elements A and B is in the condition of "not forming solid solution".

Concretely mentioned are a case where the magnetic layer (for example, the free layer 1) is of Co or a Co alloy, and a case where the magnetic layer is of an Ni alloy. Since the subbing film is preferably of an fcc metal or an hcp metal for attaining the fcc orientation in the magnetic layer, the

element constituting the MR-improving layer that is adjacent to the magnetic layer will be selected from Al, Ti, Cu, Zr, Ru, Rh, Pd, Ag, Hf, Ir, Pt, Au, etc. Of those elements, three elements of Cu, Ag and Au satisfy the requirement of not forming solid solution with Co. On the other hand, three elements of Ru, Ag and Au satisfy the requirement of not forming solid solution with Ni. For the magnetic layer of an Ni alloy, Cu will form solid solution with the Ni alloy from the relation of the two, Cu and Ni in the phase diagram. However, the present inventors' experiments have revealed the fact that, when Cu is used in the MR-improving layer, it forms less solid solution with Ni in the neighboring magnetic layer. Specifically, on the basis of the experimental data mentioned below, it is decided that an Ni alloy and Cu do not form solid solution with each other.

When the free layer is thin, the MR-improving layer acts as the nonmagnetic high-conductivity layer in the first embodiment mentioned hereinabove. However, once the interface between the nonmagnetic high-conductivity layer and the free layer has become diffusive owing to electron diffusion in that interface, the electron transmittance from the free layer to the nonmagnetic high-conductivity layer is lowered. In other words, even when the magnetization direction of the pinned layer is parallel to that of the free layer, the diffusive interface receives non-elastic electron scattering